

# Benthic indexes applied to intertidal and infralittoral rocky bottoms in relation to WFD and MSFD: assessing metrics



Beatriz Hansjosten<sup>1\*</sup>, Salud Deudero<sup>1</sup>

<sup>1</sup> Instituto Español de Oceanografía. Centre Oceanogràfic de les Balears. Moll de Ponent s/n, 07015 Palma de Mallorca, Spain – [\\*beatriz.torres@ba.ieo.es](mailto:beatriz.torres@ba.ieo.es)

## INTRODUCTION

An overview of currently used benthic indexes for evaluation of Good Ecological Status (GEcS) of **rocky bottoms** according to the WFD, and the Good Environmental Status (GEnS) according to the MSFD for European seas, is presented (acronyms used *sensu*[1]).

## AIM

to present a catalogue of the different indexes developed for WFD and MSFD.

## MATERIALS AND METHODS

A bibliographical search using online available databases and references from published articles from 2001 to 2015.

## RESULTS AND DISCUSSION

16 indexes have been found, which have been developed by different European countries, as well for different water bodies (mainly NE Atlantic (62.5%) and Mediterranean (37.5%)). The indexes target mainly two European legislation: WFD and MSFD (Figure 1).

The indexes found are (acronyms in alphabetical order):

ALEX – Alien Biotic Index; CAI – Coralligenous Assemblages Index; CARLIT-EQR – Cartography of Littoral Rocky Shore Communities; CCO – Cover, Characteristic Species, Opportunistic Species; CFR – Calidad de Fondos Rocosos (Quality of rocky bottoms); COARSE – Coralligenous Assessment by Reefscape Estimation; EEI – Ecological Evaluation Index; ESCA – Ecological Status of Coralligenous Assemblages; HPI – Helgoland Phytobenthic Index; ICS – Index of Community Structure; MarMAT – Marine Macroalgal Assessment Tool; MFCI – Marine Fish Community Index; PAN-EQ-MAT – General Ecological Quality Macroalgal Assessment Tool; QISubMac – Quality Index of Subtidal Macroalgae; RICQI – Rocky Intertidal Community Quality Index; RSL – Reduced Species List.



Fig. 1: Map of benthic indexes (n=16) followed by targeted biocenosis and number of metrics. Boxes are placed upon the targeted waterbody by indexes. For meaning of acronyms, please see text.

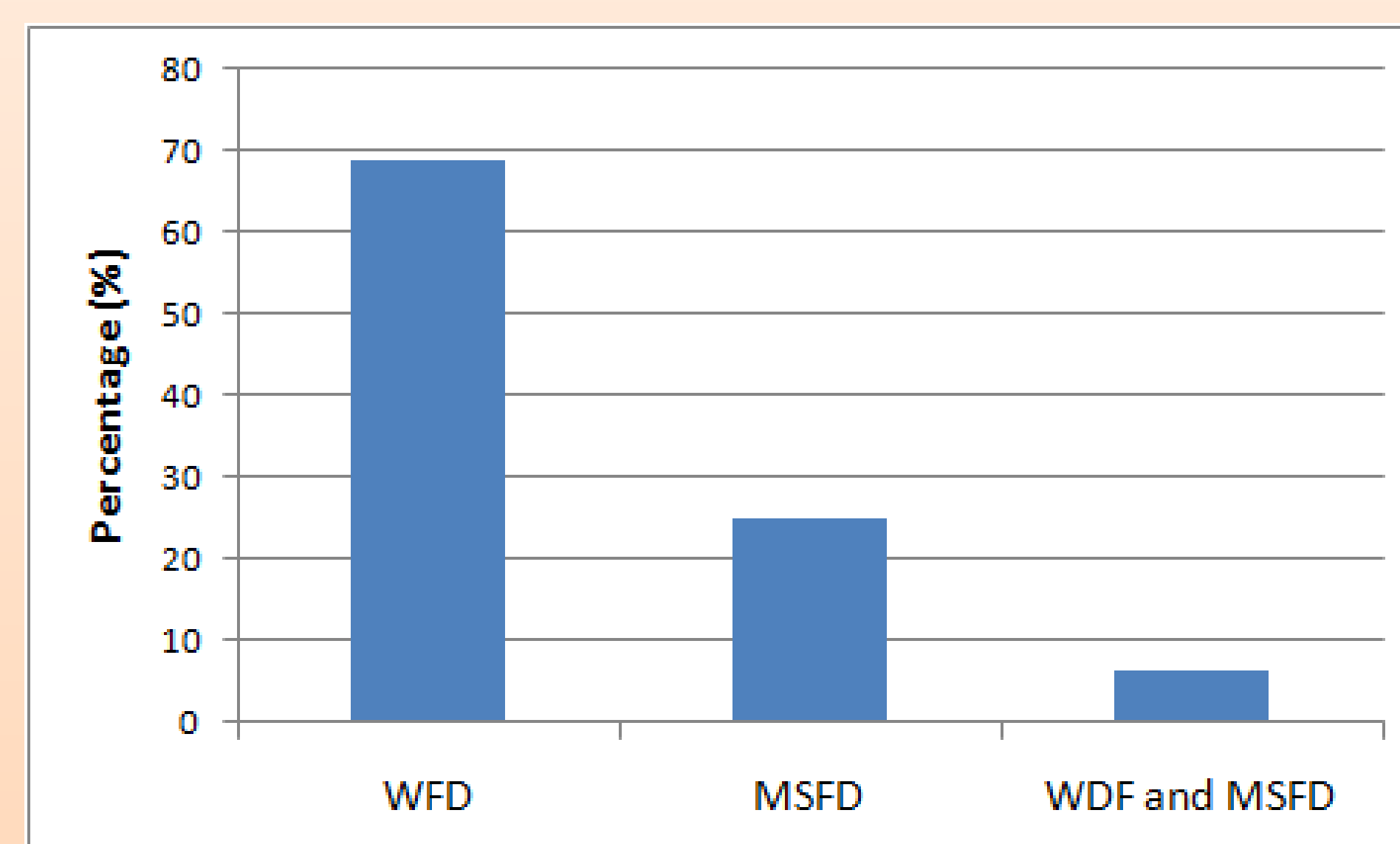


Figure 1: Percentage European legislation targeted by index extracted from revised literature (n=16 published articles), from 2001 to 2015.

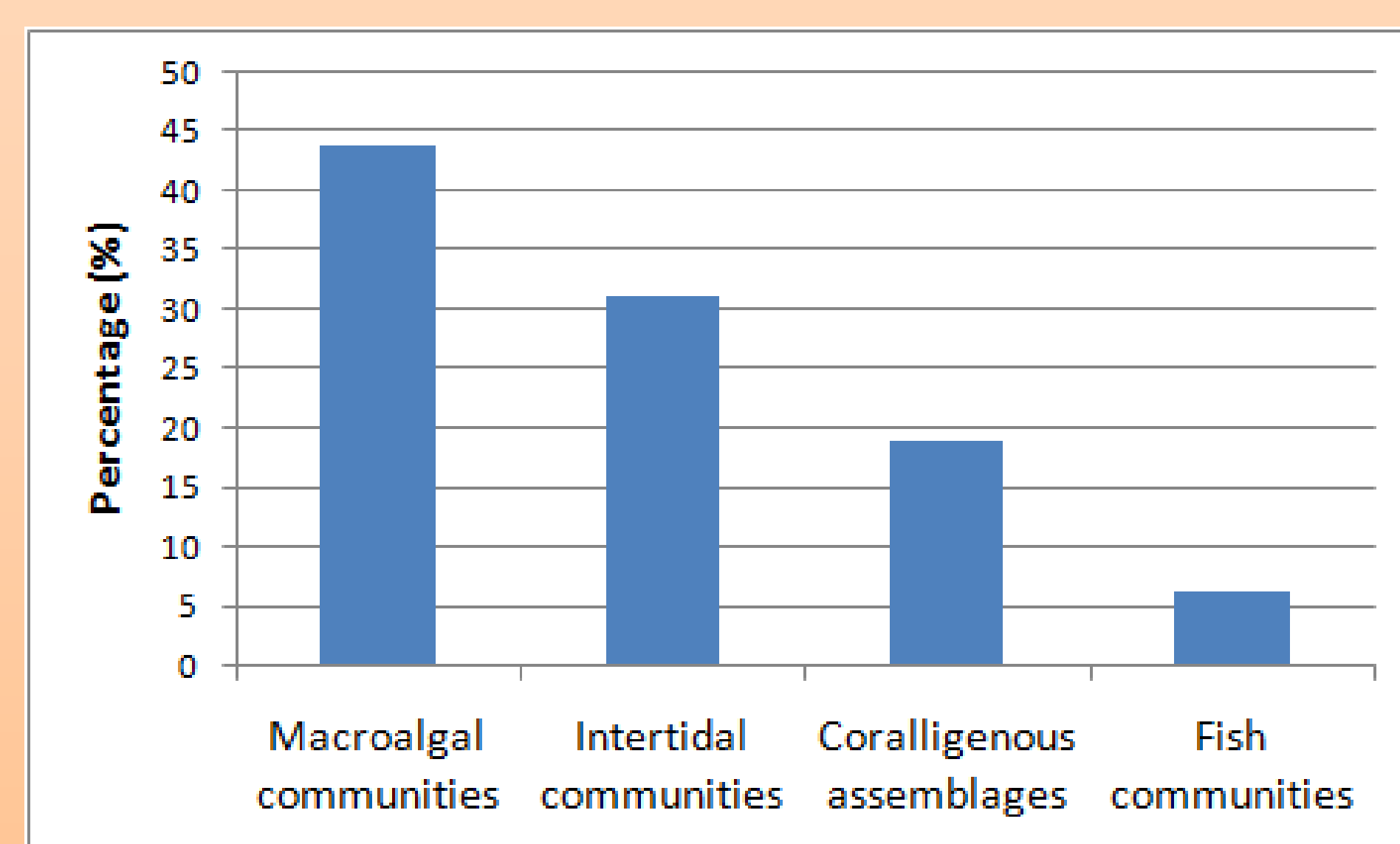


Figure 2: Percentage of biocenosis targeted by index to address WFD and MSFD extracted from revised literature (n=16 published articles), from 2001 to 2015.

These indexes target several biocenoses: Macroalgal communities, Coralligenous assemblages, Fish communities and, Intertidal communities (Fig. 2).

These indexes are usually composed by several metrics, these metrics are combined to result in a number that indicates the status of the water body that is being assessed[2]. The number of metrics varies between 2 and 9, being 3 and 4 metrics the most common.

A relation of the indexes, the targeted biocenosis, the waterbody where they are applied and the number of metrics can be found in Image 1.

This review condenses the wide array of benthic indexes that are currently being applied, allowing a comparison of metrics at rocky shores, both intertidal and subtidal, indicating the need of a more reductionist approach to assess Good Ecological Status (GEcS) and Good Environmental Status (GEnS) according to the European legislations.

## References:

- [1] Borja, A., Elliott, M., Andersen, J. H., Cardoso, A. C., Carstensen, J., Ferreira, J. G., Heiskanen, A.-S., Marques, J.C., Neto, J.M., Teixeira, H., Uusitalo, L., Uyarra, M.C., Zampoukas, N. 2013. Good Environmental Status of marine ecosystems: what is it and how do we know when we have attained it? *Marine Pollution Bulletin*, 76(1-2).
- [2] Green, R. and Chapman, P. M. 2011. The problem with indices. *Marine Pollution Bulletin*, 62(7): 1377-1380

